

Serial No. 10/001,543
Group Art Unit 1724

IN THE SPECIFICATION

Please amend the Specification as follows.

On page 1, on the first line after the title, insert:

--This patent application is a Division of prior, co-pending
U.S. Patent Application Serial No. 09/113,981, filed July 10,
1998, now U.S. Patent No. 6,315,906.--

IN THE CLAIMS:

Please amend the Claims as follows.

12. (Amended) Apparatus for removing metal ions from wastewater, comprising:

(a) a chemical mechanical polishing unit for chemical mechanical polishing integrated circuits, said chemical mechanical polishing unit having a chemical mechanical polishing effluent discharge for discharging a wastewater feed containing byproduct polishing slurry containing copper ions at a level in the range of about 1-100 mg/l;

(b) a carbon bed connected directly to said chemical mechanical polishing effluent discharge, said bed providing means for receiving said wastewater feed containing copper ions in solution, wherein said wastewater feed contains solids sized in the range of about 0.01-1.0 μm in an amount higher than about 100 mg/l; and

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(c) a chemical precipitation unit connected directly to said carbon bed, for receiving a carbon bed product stream from said carbon bed and for removing said copper ions from solution.

13. (Amended) Apparatus for removing metal ions from wastewater as set forth in Claim 12, wherein said wastewater feed contains solids in an amount higher than about 500 mg/l.

14. (Amended) Apparatus for removing metal ions from wastewater as set forth in Claim 12, wherein said wastewater feed contains hydrogen peroxide and said carbon bed product stream has concentration levels of hydrogen peroxide less than about 1 mg/l (1 ppm).

17. (Amended) Apparatus for removing metal ions from wastewater as set forth in Claim 15, wherein said chemical precipitation unit comprises organic chemical means for contacting said carbon bed product stream copper ions with an organic carbamate to precipitate said copper ions.

18. (Amended) Apparatus for removing metal ions from wastewater as set forth in Claim 15, wherein said chemical precipitation unit comprises organic chemical means for contact-

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ing said carbon bed product stream copper ions with dithiocarbamate to precipitate said copper ions.

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19. (Amended) Apparatus for removing metal ions from wastewater as set forth in Claim 15, wherein said chemical precipitation unit comprises inorganic chemical means for contacting said carbon bed product stream [metal] copper ions with iron sulfate ($FeSO_4$) or aluminum sulfate ($Al_2(SO_4)_3$) to co-precipitate said copper ions.

Please cancel Claims 15 and 16, without prejudice.

Please add the following new Claims.

21. Apparatus for removing metal ions from wastewater, comprising:

(a) a chemical mechanical polishing unit for chemical mechanical polishing integrated circuits, said chemical mechanical polishing unit having a chemical mechanical polishing effluent discharge for discharging a wastewater stream containing hydrogen peroxide and solids sized in the range of about 0.01-1.0 μm in an amount higher than about 500 mg/l and a byproduct polishing slurry containing copper ions at a level in the range of about 1-100 mg/l;

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(b) a carbon bed connected directly to said chemical mechanical polishing effluent discharge, said bed providing means for receiving said wastewater stream containing said solids, hydrogen peroxide, and copper ions in solution; and

(c) a chemical precipitation unit connected directly to said carbon bed for receiving a carbon bed product stream from said carbon bed and organic chemical means for contacting said carbon bed product stream metal ions with dithiocarbamate to precipitate said copper ions for removing said copper ions from solution.

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cont

22. Apparatus for removing metal ions from wastewater, comprising:

(a) a chemical mechanical polishing unit for chemical mechanical polishing integrated circuits, said chemical mechanical polishing unit having a chemical mechanical polishing effluent discharge for discharging a wastewater stream containing hydrogen peroxide and solids sized in the range of about 0.01-1.0 μm in an amount higher than about 500 mg/l and a byproduct polishing slurry containing copper ions at a level in the range of about 1-100 mg/l;

(b) a carbon bed connected directly to said chemical mechanical polishing effluent discharge, said bed providing means

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for receiving said wastewater stream containing said solids,
hydrogen peroxide, and copper ions in solution; and

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(c) a chemical precipitation unit connected directly to
said carbon bed for receiving a carbon bed product stream from
said carbon bed and inorganic chemical means for contacting said
carbon bed product stream metal ions with iron sulfate ($FeSO_4$) or
aluminum sulfate ($Al_2(SO_4)_3$) or aluminum sulfate to co-precipi-
tate said copper ions.

REMARKS

Claims 12-14, 17-19, and 21-22 are in the case.

The Specification has been amended to identify the present
patent application as a Division of prior, co-pending U.S. Patent
Application Serial No. 09/113,981, filed July 10, 1998, now U.S.
Patent No. 6,315,906, consistent with the Inventor's Declaration
as originally filed and the formal Transmittal letter as origi-
nally filed and as indicated on the official Filing Receipt.

Claims 12-19 have been amended to more particularly point
out and distinctly claim that which Applicants regard as their
invention and to recite a chemical mechanical polishing unit for
chemical mechanical polishing integrated circuits, the chemical
mechanical polishing unit having a chemical mechanical polishing